

Date: Wednesday, 7/5/2006 2:44:52 PM
 User: Kim Johnston

Process Sheet

Customer : CU-DAR001. Dart Helicopters Services
Job Number : 27830
Estimate Number : 12486
P.O. Number : *N/A*
This Issue : 7/5/2006 **S.O. No.** : *N/A*
Prsht Rev. : NC
First Issue : *N/A* **Type** : LANDING GEAR
Previous Run : 27829
Written By :
Checked & Approved By : *06 07.05*
Comment : Est Rev:A New Issue 06-07-05 JLM

Drawing Name : 350/355 AS X-TUBE AFT
Part Number : D350748201
Drawing Number : IIN D350-748 P5 PREL *06.07.05*
Project Number : N/A
Drawing Revision : PREL
Material : *N/A*
Due Date : 7/30/2006 **Qty:** 1 **Um:** Each

Additional Product

Job Number:



Seq. #: Machine Or Operation: Description :

1.0 DC DOCUMENT CONTROL



Comment: Photocopy bluefile & type labels per PPPD350-748-201 CHG001

KS 06 09-29

2.0 27830A X-TUBE AS 350/355 HI AFT



Comment: Sub-Component X-TUBE AS 350/355 HI AFT

3.0 PACKAGING 1 PACKAGING RESOURCE #1



Comment: PACKAGING RESOURCE #1
Pick Packing Kit

4.0 D35001 350 SADDLE



Comment: Qty.: 4.0000 Each(s)/Unit Total : 4.0000 Each(s)
350 SADDLE
Batch: *B28096*

5.0 D35011 BUSHING



Comment: Qty.: 16.0000 Each(s)/Unit Total : 16.0000 Each(s)
BUSHING
Batch: *M28127*

6.0 AN46A Bolt



Comment: Qty.: 16.0000 Each(s)/Unit Total : 16.0000 Each(s)
Bolt
Batch: *M101418*

B06/09/28

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Mfg / Design Mgr	Approval QC Inspector

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Design Mgr	Approval QC Inspector
			Initial Design Mgr	Action Description Design Mgr	Sign & Date			

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

NOTE: Date & initial all entries

QA: N/C Closed: _____ Date: _____

Date: Wednesday, 7/5/2006 2:44:52 PM
User: Kim Johnston

Process Sheet

Customer: CU-DAR001 Dart Helicopters Services

Drawing Name: 350/355 AS X-TUBE AFT

Job Number: 27830

Part Number: D350748201

Job Number:



Seq. #:

Machine Or Operation:

Description :

7.0

AN441A

bolt



Comment: Qty.: 8.0000 Each(s)/Unit Total : 8.0000 Each(s)

bolt

Batch: M101538 ✓

8.0

AN532A

Bolt



Comment: Qty.: 4.0000 Each(s)/Unit Total : 4.0000 Each(s)

Bolt

Batch: M101648 ✓

9.0

AN960JD416

Washer



Comment: Qty.: 32.0000 Each(s)/Unit Total : 32.0000 Each(s)

Washer

Batch: M19185 ✓

10.0

AN960JD516

Washer



Comment: Qty.: 8.0000 Each(s)/Unit Total : 8.0000 Each(s)

Washer

Batch: M101369 ✓

11.0

MS21042L4

Nut



Comment: Qty.: 24.0000 Each(s)/Unit Total : 24.0000 Each(s)

Nut

Batch: M19099 ✓

12.0

MS21042L5

Nut



Comment: Qty.: 1.0000 Each(s)/Unit Total : 1.0000 Each(s)

Nut

Batch: M101648 ✓

2006/09/28

13.0

QC4

INSPECT 100% KITS FOR COMPLETENESS



Comment: INSPECT 100% KITS FOR COMPLETENESS

2006/09/28 (1)

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Mfg / Design Mgr	Approval QC Inspector

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Design Mgr	Approval QC Inspector
			Initial Design Mgr	Action Description Design Mgr	Sign & Date			

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes ☒ No ☐ DQA: ☒ Date: 06/05/07

NOTE: Date & initial all entries

QA: N/C Closed: _____ Date: _____

Date: Wednesday, 7/5/2006 2:44:52 PM
User: Kim Johnston

Process Sheet

Customer: CU-DAR001 Dart Helicopters Services

Drawing Name: 350/355 AS X-TUBE AFT

Job Number: 27830

Part Number: D350748201

Job Number:



Seq. #:

Machine Or Operation:

Description :

14.0

PACKAGING 1

PACKAGING RESOURCE #1



Comment: PACKAGING RESOURCE #1

Identify and pack for shipping as per PPP D350-748-201

Location:

PPP Rev:

DART

Rec'd 7/29

15.0

DC

DOCUMENT CONTROL



Comment: DOCUMENT CONTROL

Inspection Level 21

DP 06/09/29

Job Completion



W 6-8-29

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Mfg / Design Mgr	Approval QC Inspector

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Design Mgr	Approval QC Inspector
			Initial Design Mgr	Action Description Design Mgr	Sign & Date			

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

NOTE: Date & initial all entries

QA: N/C Closed: _____ Date: _____

3.10 Apply a continuous bead of Sikaflex-241/-291 or Proseal 890 or MIL-S-8802 Class B2 sealant in the following locations as per Figure 6:

- A) Along saddle/crosstube interface.
- B) Between the saddle flanges.
- C) Along saddle/skidtube interface.

4.0 WEIGHT AND BALANCE

The following weight and balance information is for Dart crosstube installations only. This data should be similar to the existing installation. Differences from the parts removed are the responsibility of the installer.

DART CROSSTUBE	FWD/AFT	WEIGHT	STA	MOMENT
D350-748-101	Fwd	35.2 lb (16.0 kg)	106.3 in (2.70 m)	3742 lb-in (43.2 kg-m)
D350-748-201	Aft	34.7 lb (15.7 kg)	162.4 in (4.12 m)	5635 lb-in (64.7 kg-m)

5.0 PARTS LIST

Qty -101	Qty -201	Part Number	Description
X		D350-748-101	CROSSTUBE INSTALLATION, AS 350/355 HIGH FWD
	X	D350-748-201	CROSSTUBE INSTALLATION, AS 350/355 HIGH AFT
1		D350-748-141	CROSSTUBE ASSEMBLY, AS 350/355 HIGH FWD
	1	D350-748-241	CROSSTUBE ASSEMBLY, AS 350/355 HIGH AFT
*2	*2	D3502-1	SUPPORT
*2	*2	D2856-400-710	ABRASION STRIP
*1	*1	AELS-1032-225	INSERT
*2	*2	MS21920-20	CLAMP
*1	*1	MS27039-1-10	SCREW
*1	*1	AN960JD10	WASHER
4	4	D3500-1	SADDLE
16	16	D3501-1	BUSHING
16	16	AN4-6A	BOLT
8	8	AN4-41A	BOLT
4	4	AN5-32A	BOLT
32	32	AN960JD416	WASHER
8	8	AN960JD516	WASHER
24	24	MS21042L4	NUT (OR MS21042-4)
4	4	MS21042L5	NUT (OR MS21042-5)

* REFERENCE ONLY. PARTS ARE INCLUDED IN D350-748-141/241 ASSEMBLIES ABOVE

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SUBJECT TO AMENDMENT
WITHOUT NOTICE
WORK ORDER
NO. 27830

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Revision: A
Date: 06.05.08

Date: Wednesday, 7/5/2006 2:45:07 PM
User: Kim Johnston

Process Sheet

Customer	: CU-DAR001 Dart Helicopters Services	Drawing Name	: X-TUBE AS 350/355 HI AFT
Job Number	: 27830A		
Estimate Number	: 12483		
P.O. Number	: N/A	Part Number	: D350748241
This Issue	: 7/5/2006	S.O. No.	: N/A
Prsht Rev.	: NC	Drawing Number	: D350-748-241 PREL
First Issue	: N/A	Project Number	: N/A
Previous Run	: 27829A	Drawing Revision	: PREL
	Type : LANDING GEAR	Material	: N/A
Written By	:	Due Date	: 7/30/2006
Checked & Approved By	: <u>JA 06 07.05</u>	Qty:	1 Um: Each
Comment	: Est Rev:A New Issue 06-07-05 JLM		

Additional Product

Job Number:



Seq. #:	Machine Or Operation:	Description :
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1.0

DC

DOCUMENT CONTROL



Comment: DOCUMENT CONTROL

Photocopy bluefile and create labels as per PPP D350-748-241 CHG001

KS 06 07.05 ①

2.0

D6018125

Crosstube Material



Comment: Qty.: 1.0000 Each(s)/Unit Total: 1.0000 Each(s)

Crosstube Material

D6018-125

2.299" OD X 2.000" ID

Batch: 27318

100469

MS 06/07/08 1

3.0

MORI SEIKI

MORI SEIKI CNC LATHE LARGE



Comment: MORI SEIKI CNC LATHE LARGE

1-Fill tube with sand & install plugs DT _____ on both ends as per Folio FA647

2-Turn first side as per Folio FA647 ← N/A

3-Deburr & Inspect for surface damage. Repair damage within limits as per Dwg D350-748-241.

MS 06/07/09 1

QC1

INSPECT ALL DIM TO DIM SHEET



Comment: INSPECT ALL DIM TO DIM SHEET

MS 06/07/09 1

Approved forms INCRWO revC

W/O:		WORK ORDER CHANGES						
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Mfg / Design Mgr	Approval QC Inspector	
06.10.03	14	CAD Plate and Magnetic Particle Inspect per D350-748-241 Rev C Acceptable to CAD Plate to spec AMS-QQ-P-416B See attached DS email				CP 06.10.03 per QSI 042		

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Design Mgr	Approval QC Inspector
			Initial Design Mgr	Action Description Design Mgr	Sign & Date			
06.08.17	3	Some QD dimensions do not match drawing	UP 06.08.17 per QSI 042	Part is OK per attached DS email		UP 06.08.17 per QSI 042		

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes ☐ No ☒ DQA: ☒ Date: 06/09/2017

NOTE: Date & initial all entries

QA: N/C Closed: _____ Date: _____

Date: Wednesday, 7/5/2006 2:45:07 PM
User: Kim Johnston

Process Sheet

Customer: CU-DAR001 Dart Helicopters Services

Drawing Name: X-TUBE AS 350/355 HI AFT

Job Number: 27830A

Part Number: D350748241

Job Number:



Seq. #:

Machine Or Operation:

Description :

5.0

MORI SEIKI

MORI SEIKI CNC LATHE LARGE



Comment: MORI SEIKI CNC LATHE LARGE

1-Turn second side as per Folio FA647

2-Deburr & Inspect for surface damage. Repair damage within limits as per Dwg D350-748-241.

MS 06/07/09 1

6.0

QC1

INSPECT ALL DIM TO DIM SHEET



Comment: INSPECT ALL DIM TO DIM SHEET

MS 06/07/09 1

7.0

QC8

SECOND CHECK



Comment: SECOND CHECK

SC 06.07.17 1

8.0

OUTSIDE SERVICE

OUTSIDE SERVICES



Comment: Sub-Contracting OUTSIDE SERVICES

Issue P/O: 1709

Heat Treat to min 180 KSI As per Dwg D350-748-241

Sand Blast tube after Heat Treat

Possible Supplier: Vac Aero

Ensure Certificate of Conformity is attached

u 06.07.18

9.0

PACKAGING 1

PACKAGING RESOURCE #1



Comment: PACKAGING RESOURCE #1

Receive & Inspect For Transit Damage

Ensure certificate of conformaty is attached

RB 06/07/31 P10

10.0

QC6

DIMENSIONAL CHECK



Comment: DIMENSIONAL CHECK

06/09/06

11.0

BENDING

BENDING MACHINE



Comment: BENDING MACHINE

Bend tube as per Dwg D350-748-241 using CNC bender program _____ and Folio FT _____

06/09/07

QC6 dimensional check.

P70



W/O:		WORK ORDER CHANGES						
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Mfg / Design Mgr	Approval QC Inspector	
06-08-09	161	Add a c g before drilling. Parm. Change <i>J</i>					<i>J</i> 06-08-09	

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Design Mgr	Approval QC Inspector
			Initial Design Mgr	Action Description Design Mgr	Sign & Date			

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

NOTE: Date & initial all entries

QA: N/C Closed: _____ Date: _____

Date: Wednesday, 7/5/2006 2:45:07 PM
User: Kim Johnston

Process Sheet

Customer: CU-DAR001 Dart Helicopters Services

Drawing Name: X-TUBE AS 350/355 HI AFT

Job Number: 27830A

Part Number: D350748241

Job Number:



Seq. #:

Machine Or Operation:

Description :

12.0

LANDING GEAR 1

LANDING GEAR RESOURCE 1



Comment: LANDING GEAR RESOURCE 1

1-Remove all marks from tube within limits of D350-748-241

2-Drill Tube as per Dwg D350-748-241

3-Deburr

4-Engrave Part # and Batch # as per Dwg D350-748-241

DPG-8-23

DPG-8-25

Done at Seq#5

13.0

QCS



DIMENSIONAL CHECK



Comment: DIMENSIONAL CHECK

Done at Seq#11

060907①

14.0

OUTSIDE SERVICE

OUTSIDE SERVICES



Comment: Sub-Contracting OUTSIDE SERVICES

Liquid Penetrant Inspection as per QSI 038

Issue P/O: 2000

LPI as per ASTM 1417 Level 2

Attach copy of NDT results to work order

0606109111 ①

SEE ATTACHED DEVIATION CP

15.0

PACKAGING 1

PACKAGING RESOURCE #1



Comment: PACKAGING RESOURCE #1

Inspect for transit damage Ensure copy of NDT results attached to work order.

0608178

16.0

QC6

DIMENSIONAL CHECK



Comment: Inspect for damage & ensure results are as per Dwg D350-748-241

060928①

17.0

SPRAY PAINTING

SPRAY PAINTING



Comment: SPRAY PAINTING

1-Prime inside crosstube as per QSI 005 4.2

PRIME OUTSIDE OF CROSSTUBE PER QSI 005 4.2

060928 ①

060825

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Mfg / Design Mgr	Approval QC Inspector
06.09.25	17 19	PRIME INSIDE & OUTSIDE OF TUBE THEN PAINT PER Q51005 4.2 PER DWS D350-748-241 Rev.C	<i>[Signature]</i>	06.09.28	1	<i>[Signature]</i> 06.09.25 DC 451042	

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Design Mgr	Approval QC Inspector
			Initial Design Mgr	Action Description Design Mgr	Sign & Date			

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

NOTE: Date & initial all entries

QA: N/C Closed: _____ Date: _____

Date: Wednesday, 7/5/2006 2:45:07 PM
User: Kim Johnston

Process Sheet

Customer: CU-DAR001 Dart Helicopters Services

Drawing Name: X-TUBE AS 350/355 HI AFT

Job Number: 27830A

Part Number: D350748241

Job Number:



Seq. #:

Machine Or Operation:

Description :

18.0

QC14

Inspect Spray Paint



N/A



Comment: Inspect Spray Paint

Then, Wrap in plastic bag to protect from scratches

19.0

POWDER COATING

PAINT

POWDER COATING



06-09-25



Comment: POWDER COATING

PAINT OUTSIDE OF CRUSSTUBE PER QSI 005 4.2
Powder Coat White Gloss (Ref: 4.3.5.1) as per QSI 005 4.3

06-09-28 (1)

20.0

QC3

INSPECT POWDER COAT/CHEMICAL CONVERSION



06-09-25 (1)



Comment: INSPECT POWDER COAT/CHEMICAL CONVERSION

PAINT

21.0

D35021

SUPPORT



06-09-25



Comment: Qty.: 2.0000 Each(s)/Unit Total : 2.0000 Each(s)

SUPPORT

Batch: 027874

RT

06-09-29

22.0

D2856400

Abrasion Strip



Comment: Qty.: 1.2401 f(s)/Unit Total : 1.2401 f(s)

Abrasion Strip 7.10" long x2

Batch: 27545

RT

06-09-29

23.0

ALS41032225

Insert



Comment: Qty.: 1.0000 Each(s)/Unit Total : 1.0000 Each(s)

Insert

Batch: M100489

RT

06-09-29

24.0

AN960JD10

Washer



Comment: Qty.: 1.0000 Each(s)/Unit Total : 1.0000 Each(s)

Washer

Batch: 100743

RT

06-09-29

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Mfg / Design Mgr	Approval QC Inspector

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Design Mgr	Approval QC Inspector
			Initial Design Mgr	Action Description Design Mgr	Sign & Date			

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

NOTE: Date & initial all entries

QA: N/C Closed: _____ Date: _____

Date: Wednesday, 7/5/2006 2:45:07 PM
User: Kim Johnston

Process Sheet

Customer: CU-DAR001 Dart Helicopters Services

Drawing Name: X-TUBE AS 350/355 HI AFT

Job Number: 27830A

Part Number: D350748241

Job Number:



Seq. #:

Machine Or Operation:

Description :

25.0

MS2192020

Clamp (per MIL-DTL-8783C)



Comment: Qty.: 2.0000 Each(s)/Unit Total: 2.0000 Each(s)

Clamp (per MIL-DTL-8783C)

Batch: M15736

RT 06-09-29

26.0

MS35206344

MS27039-1-10

Screw



Comment: Qty.: 1.0000 Each(s)/Unit Total: 1.0000 Each(s)

Screw

Batch: 18836

RT 06-09-29

27.0

LANDING GEAR 1

LANDING GEAR RESOURCE 1



Comment: LANDING GEAR RESOURCE 1

1-Install Ground wire Insert, then insert screw and washer

2-Install Abrasion strips as per Dwg D350-748-241 & QSI 035.

3-Install supports as per Dwg D350-748-241, Torque to 60-80 IN-LBS

RT DP 6-9-29

28.0

QC5

INSPECT WORK TO CURRENT STEP



Comment: INSPECT WORK TO CURRENT STEP

RT 06-09-29

29.0

PACKAGING 1

PACKAGING RESOURCE #1



Comment: PACKAGING RESOURCE #1

Identify and pack for shipping as per PPP D350-748-241

Location:

PPP Rev:

Q1001

MD 6/9/29

30.0

DC

DOCUMENT CONTROL



Comment: DOCUMENT CONTROL

Inspection Level 21

RT 06/09/29

Job Completion



W 06-09-29

POSITIVE RECALL

EFFECTIVE 06/09/29 AUTH

RELEASED 06/09/29 DATE 06/09/29

Verby carts
Verby like dims

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Mfg / Design Mgr	Approval QC Inspector

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Design Mgr	Approval QC Inspector
			Initial Design Mgr	Action Description Design Mgr	Sign & Date			

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

NOTE: Date & initial all entries

QA: N/C Closed: _____ Date: _____

PRELIMINARY ISSUE

DESIGN <i>90</i>	DRAWN BY	DART AEROSPACE LTD HAWKESBURY, ONTARIO, CANADA	
CHECKED	APPROVED	DRAWING NO. D350-748-241	REV. B SHEET 1 OF 3
DATE 06.06.30		TITLE CROSSTUBE (AS 350/355 HI AFT)	SCALE NTS
A	06.03.31	NEW ISSUE	
B	06.06.30	ADD D6018-125 & PRIME AND PAINT	

QTY	P/N	DESCRIPTION
X	D350-748-241	CROSSTUBE ASSEMBLY (AS 350/355 HI AFT)
1	D6018-125	CROSSTUBE (OR D6015-125)
2	D3502-1	SUPPORT
2	D2856-400-710	ABRASION STRIP
1	AELS-1032-225	INSERT
1	AN960JD10	WASHER
2	MS21920-20	CLAMP
1	MS35206-344	SCREW

New Rev.

D350-748-141 CROSSTUBE:

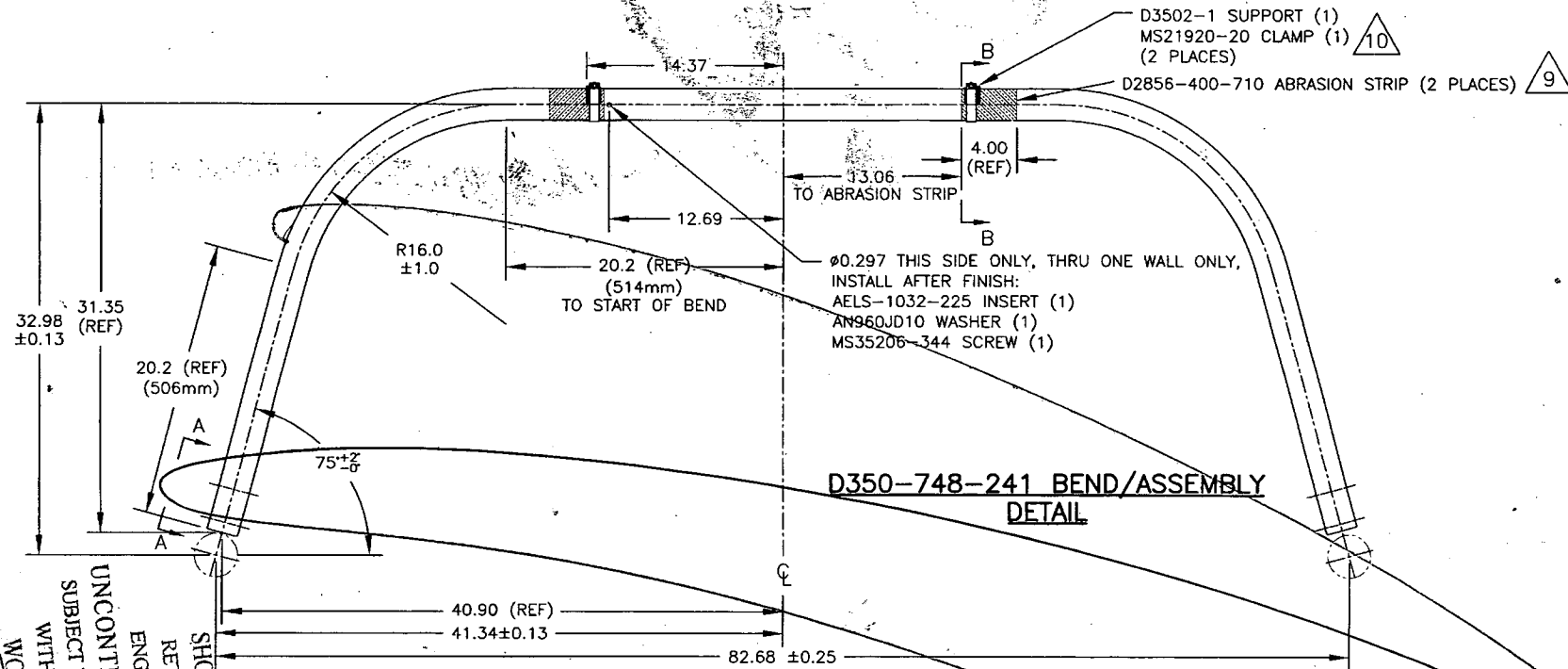
- 1) MATERIAL: MANUFACTURED FROM D6018-125 OR D6015-125
FINISHED LENGTH = 122.70±0.06
- 2) MACHINE PER MACHINING DETAIL ON PAGE 3. BLEND OUT ALL EDGES FROM MACHINING LONGITUDINALLY, TRANSITIONS SHOULD BE SMOOTH. NOTE: ALL HOLES ARE DRILLED AFTER BENDING.
- 3) SCRIBE DART PART NUMBER AND BATCH NUMBER IN THIS AREA WITH VIBRATING STYLUS.
- 4) BEND PROGRESSIVELY WITH A MINIMUM OF 7 PASSES. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 6% BASED ON O.D.
- 5) HEAT TREAT TO MIN. 180 KSI PER MIL-T-6736 AFTER TURNING
- 6) LIQUID PENETRANT INSPECT OUTSIDE SURFACE OF CROSSTUBE PER QSI 038.
- 7) FINISH: POWDER COAT WHITE (4.3.5.2) OUTSIDE PER DART QSI 005 4.3.
PRIME INSIDE PER DART QSI 005 4.2.
OR
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2
PAINT OUTSIDE PER DART QSI 005 4.2
- 8) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE. WHEN DRILLING HOLES EXTREME CARE MUST BE TAKEN AND CAREFUL DEBURRING PERFORMED TO ENSURE A CLEAN HOLE WITH NO CRACKING/CHIPPING/GROOVES.
- 9) INSTALL D2856-400-710 ABRASION STRIP WITH A GAP ON BOTTOM SIDE OF CROSSTUBE, CENTERED OPPOSITE D3502-1 SUPPORT, PER QSI 035.
- 10) TORQUE MS21920-20 CLAMPS 60 TO 80 IN-LB
- 11) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
- 12) ALL DIMENSIONS ARE IN INCHES
- 13) PART IS SYMMETRIC ABOUT CENTERLINE EXCEPT FOR Ø0.297 HOLE.

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NO. **27830A**

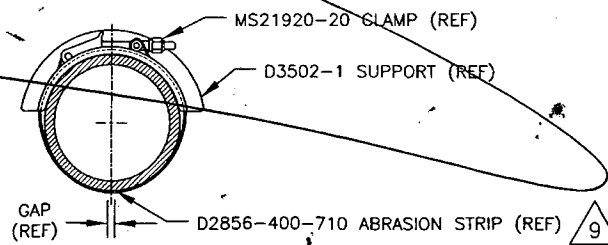
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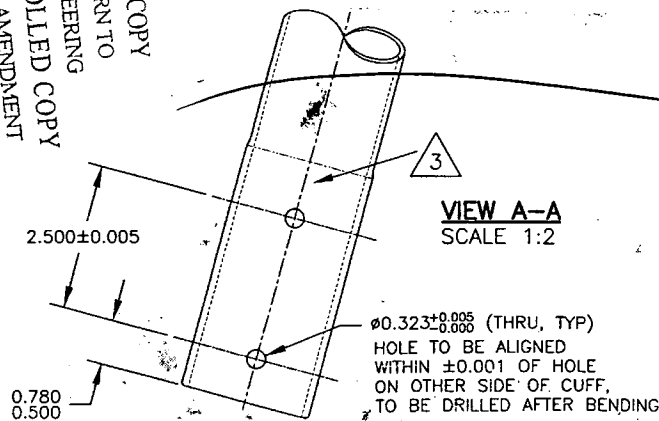
PRELIMINARY ISSUE



SECTION B-B
SCALE 1:2

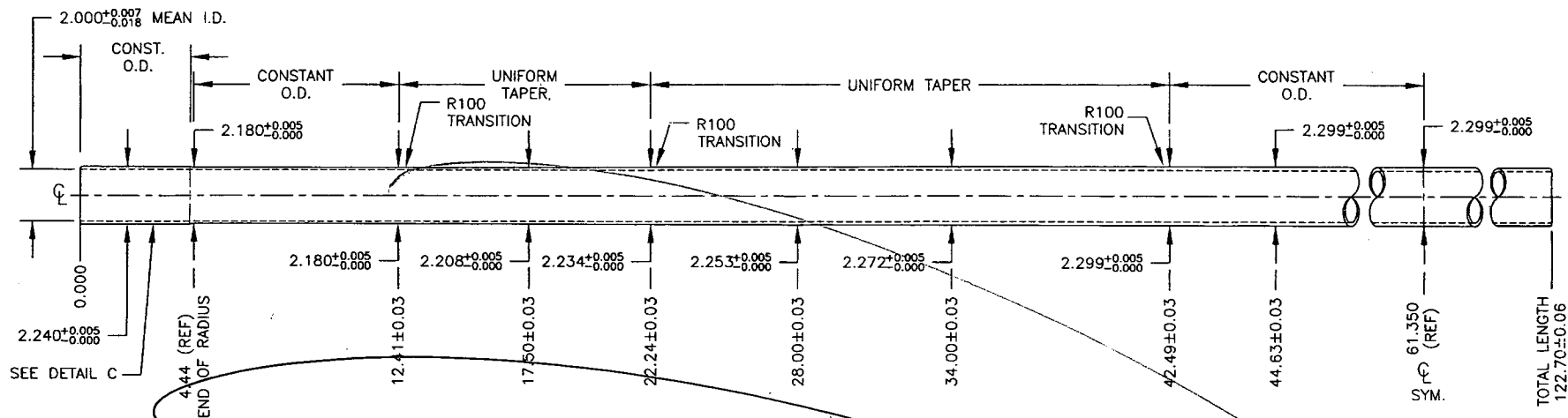


VIEW A-A
SCALE 1:2



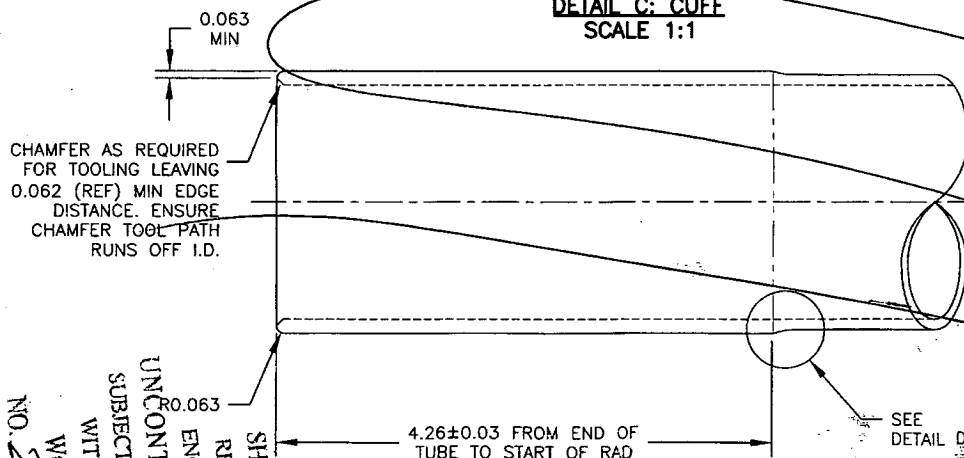
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NO. 27830A

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		DATE		DRAWING NO.	REV. B
		06.06.30		D350-748-241	SHEET 2 OF 3
				TITLE	SCALE
				CROSSTUBE (AS 350/355 HI AFT)	1:8

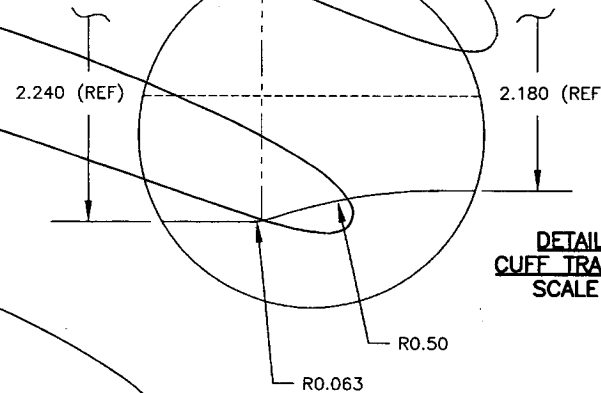


D350-748-241 MACHINING DETAIL

DETAIL C: CUFF SCALE 1:1



DETAIL D: CUFF TRANSITION SCALE 9:1



PRELIMINARY ISSUE

NO. 27830A
WORK ORDER
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DATE 06.06.30		TITLE CROSSTUBE (AS 350/355 HI AFT)		SCALE 1:4	

DART AEROSPACE LTD		Work Order: 27830 A
Description: X-Tube AS 350/355 HI AFT		Part Number: D350748241
Inspection Dwg:	Rev:	Page 1 of 1

FIRST ARTICLE INSPECTION CHECKLIST

☒ First Article ☒ Prototype

Drawing Dimension	Tolerance	Actual Dimension	Accept	Reject	Method of Inspection	Comments
2.240	$\pm .005$ $-.000$	2.242	✓			✓
2.180	"	2.182	✓			✓
2.180	"	2.185	✓			+0.010"
2.208	"	2.213	✓			+0.010"
2.234	"	2.241				+0.010"
2.253	"	2.261				+0.007"
2.272	"	2.277	✓			+0.007"
2.299	"	2.300	✓			-0.003"
2.299	"	2.300	✓			-0.002"
.063	"	.065	✓			
4.26	$\pm .030$	4.26	✓			Center 2.272 5-0.007"
122.70	$\pm .060$	122.70	✓			
2.240	$\pm .005$ $-.000$	2.241	✓			✓
2.180	"	2.183	✓			✓
2.180	"	2.183	✓			+0.011"
2.208	"	2.213	✓			+0.012"
2.234	"	2.242				+0.009"
2.253	"	2.261				+0.010"
2.272	"	2.276	✓			+0.003"
2.299	"	2.301	✓			✓
2.299	"	2.300	✓			✓
.063	"	.065	✓			
4.26	$\pm .030$	4.26	✓			

Measured by:	MS
Date:	06/07/09

Audited by:	SK
Date:	6-9-09

Prototype Approval:	
Date:	

Rev	Date	Change	Revised by	Approved
A		New Issue	KJ/JLM	

DART AEROSPACE LTD		Work Order: 27830 A
Description:		Part Number: 0350-748-241
Inspection Dwg:	Rev:	Page 1 of 1

FIRST ARTICLE INSPECTION CHECKLIST

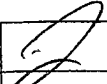
☒

First Article

☒

Prototype

Drawing Dimension	Tolerance	Actual Dimension	Accept	Reject	Method of Inspection	Comments
Point 1	MIN 0.100"	a) 0.118	✓		Ultrasonic thickness gauge.	
② 28.00" length		b) 0.112	✓			
		c) 0.116	✓			
		d) 0.123	✓			
Point 2	MIN 0.130"	a) 0.131	✓			
⑥ 61.75" length		b) 0.131	✓			
		c) 0.136	✓			
		d) 0.131	✓			
Point 3	MIN 0.100"	a) 0.110	✓			
② 28.00" length		b) 0.112	✓			
		c) 0.123	✓			
		d) 0.121	✓			
ID 2.000	+0.007 -0.018	2.003	✓		VERN	
	+0.007 -0.018	2.000	✓		VERN	
	+0.007/-0.018				CALC	
	+0.007/-0.018				CALC	
	+0.007/-0.018				CALC	

Measured by: 	Audited by: BG	Prototype Approval:
Date: 06-07-17	Date: 06-07-18	Date:

Rev	Date	Change	Revised by	Approved
A		New Issue	KJ/JLM	



VAC AERO
INTERNATIONAL INC.

PACKING SLIP



HEAD OFFICE
1371 SPEERS ROAD, OAKVILLE, ONTARIO
CANADA L6L 2X5
TEL: (905) 827-4171 FAX: (905) 827-7489



QUEBEC DIVISION
7450 RUE VÉRITÉ STREET, ST. LAURENT, QUÉBEC
CANADA H4S 1C5
TEL: (514) 334-4240 FAX: (514) 334-6269

GST No.: R105468102

OAK 77605-1

07/28/2006

MM/DD/YYYY

PAGE 1

BILL TO: 1DAR01
DART AEROSPACE LTD.
1270 ABERDEEN ST.
HAWKESBURY, ON

K6A 1K7

SHIP TO: DART AEROSPACE LTD.
1270 ABERDEEN ST.
HAWKESBURY, ON

K6A 1K7

3 of 4

DATE SHIPPED	SHIP VIA	F.O.B.
07/28/2006	4 EPIC	ORIGIN
CUSTOMER P/O No.	JOB No.	TERMS
1709		COD

LN	PART NO	DESCRIPTION	UOM	QTY ORDERED	QTY SHIPPED	B/O QTY
01	D350-CROSS TUBES	Process Specifications: Procedure: 4353 HEAT TREATED TO 180-200 KSI PER AMS 2759-1C MATERIAL: 4130 D350-748-141 B27823A, B27824A, B27825A, B27826A D350-748-241 B27830A, B27829A, B27827A, B27828A NOTE: SAND BLAST TUBES	EA	8	8	0
02	LC	LOT CHARGE 320LBS X \$2.26/LB		1	1	0

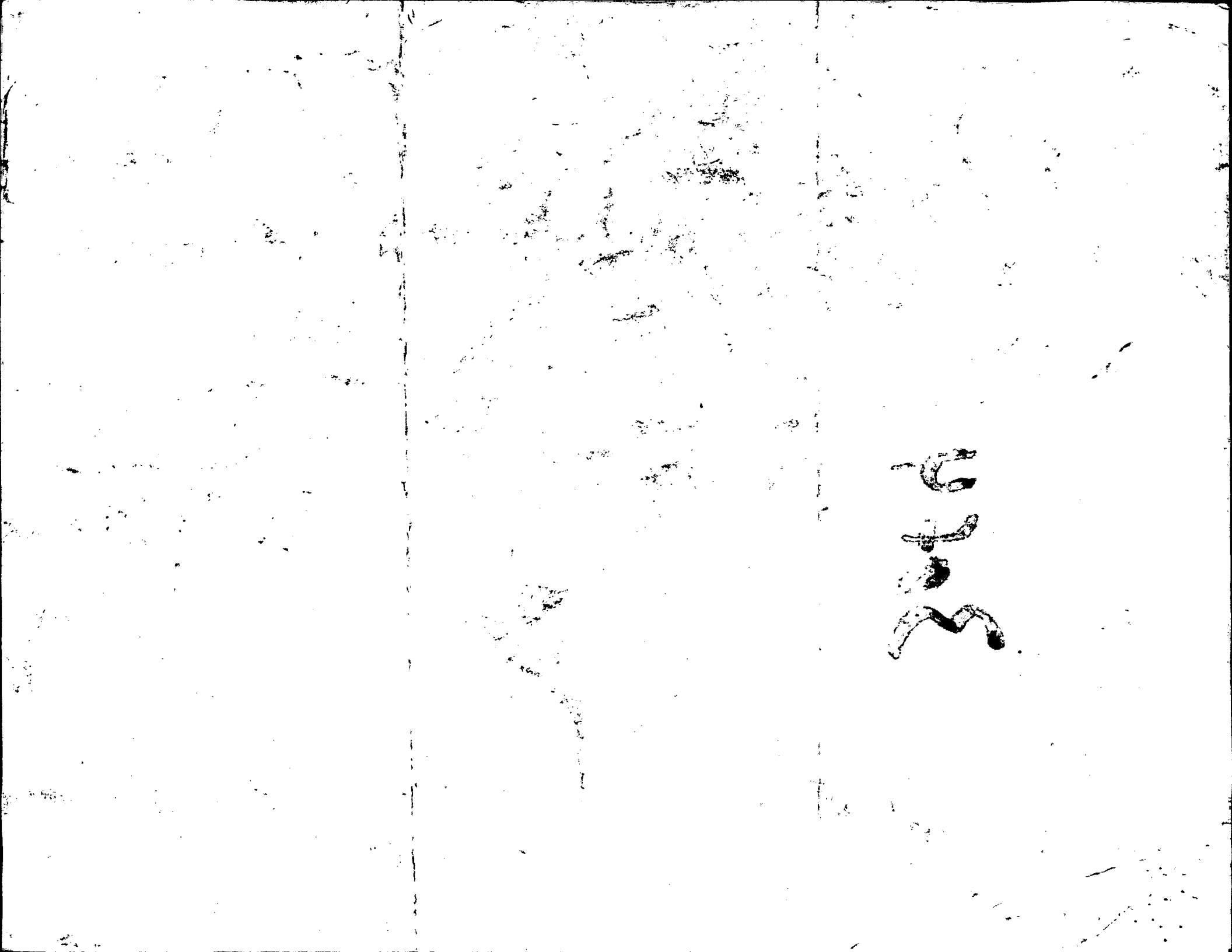
No claims for shortage in weight or count will be entertained, unless presented within 5 working days after receipt of materials by customer.

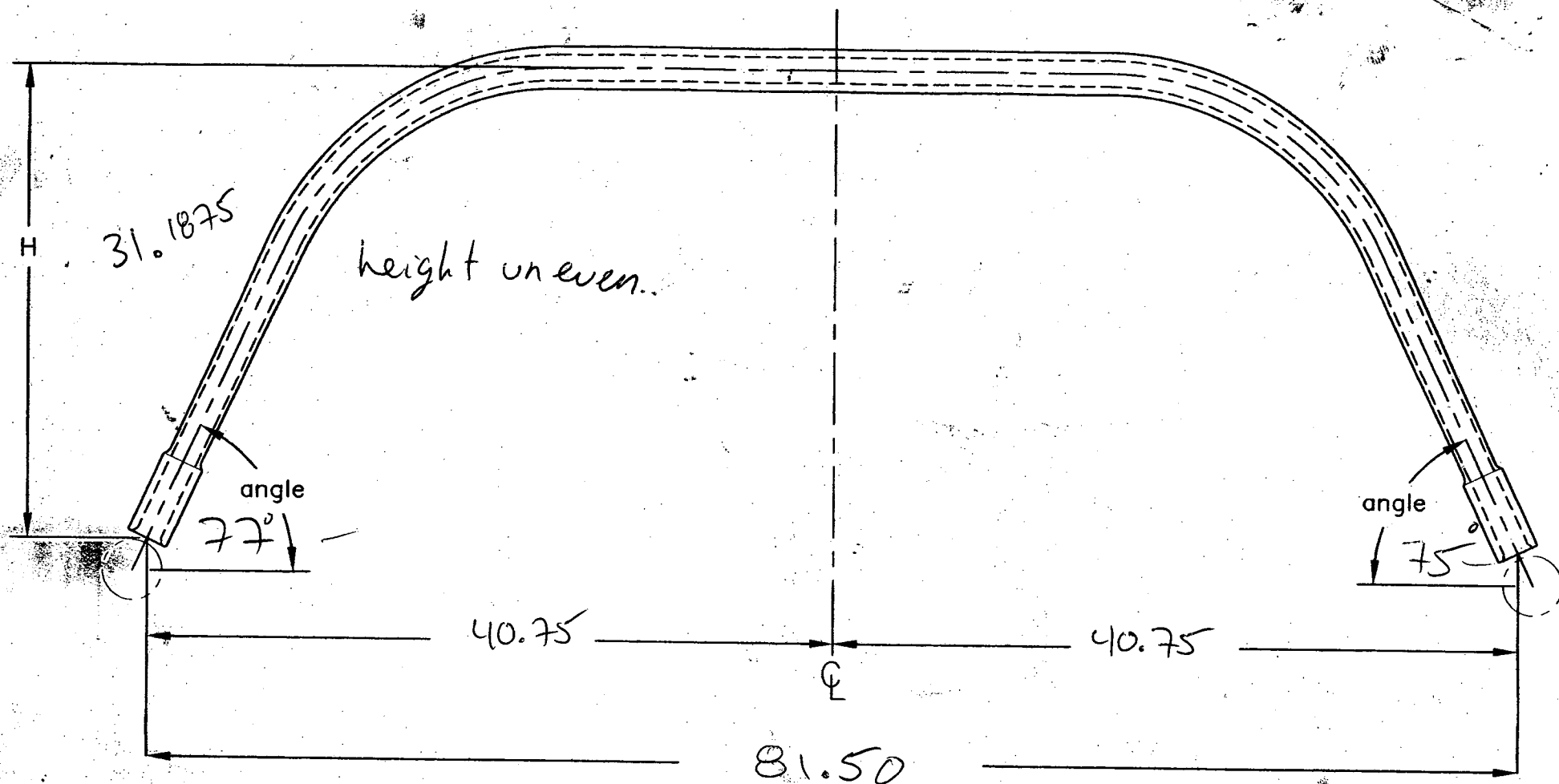


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TURBINE COMPONENT OVERHAUL · PLASMA AND OTHER COATINGS



HEAT
TREATING





DATE: 06-08-09

DESCRIPTION: ~~27830~~ 350-748-241

BATCH NO: 27830

DRAWING: 350 Prelim. Rev. 6

H: 31.35

1/2 SPAN: 40.90 \pm .130

TOTAL SPAN: 81.8

ANGLE: 75 \pm 2
-0

18 0602-09

20602-09

Chris Provencal

From: S Shahbazian [sshahbazian@dartaero.com]
Sent: August 17, 2006 12:18 PM
To: Provencal, Chris
Subject: FW: 350 aft Xtube OD variations

Please verify see if B27829A can be salvaged.

Serge Shahbazian
Design Manager
Dart Aerospace Ltd.
Tel: 613-632-3336

-----Original Message-----

From: David Shepherd [mailto:dshepherd@dartaero.com]
Sent: August 17, 2006 12:13 PM
To: 'S Shahbazian'
Cc: 'Dan Stow'; 'L Lacelle'
Subject: RE: 350 aft Xtube OD variations

D350-748-241 B27827A, B27828A, and B27830A are acceptable to me.

D350-748-241 B27829A is unacceptable to me at this point.

If you want to try to salvage it, I think we should look at the ID and calculate some inertias for comparison.

David

-----Original Message-----

From: S Shahbazian [mailto:sshahbazian@dartaero.com]
Sent: Tuesday, August 08, 2006 6:47 AM
To: Shepherd, David
Subject: FW: 350 aft Xtube OD variations

Hi David,

Please see attached FAI sheets for the 350 X-tubes that Dan put it together.

As Dan is explaining below the last two columns named Actual Dims and variance are measurements after heat treatments.

Thanks
Serge

-----Original Message-----

From: Dan Stow [mailto:dstow@dartaero.com]
Sent: August 5, 2006 11:24 AM
To: sshahbazian@dartaero.com; Bill Beckett (E-mail)
Cc: chrisp@dartaero.com
Subject: 350 aft Xtube OD variations

Bill/Serge,

Please review and send to David.
Thanks Dan

Attached is a photo containing the FAI sheets for the 350 aft Xtubes Batches: 27827A, 27828A, 27829A, and 27830A. In the last two columns renamed Actual Dims and Variance from DWG Dims are the measurements that I took after they came back from heat treating and sand blasting. Please Note that the dimensions are not the same all the way around the OD of the tube, the majority of the circumferences of the tubes are within tolerance but there seems to be a "flat" spot in some places. Are the tubes acceptable?

Dan



DESIGN QP	DRAWN BY QP	DART AEROSPACE LTD HAWKESBURY, ONTARIO, CANADA	
CHECKED #	APPROVED #	DRAWING NO. D350-748-241	REV. C SHEET 1 OF 3
DATE 06.08.14		TITLE CROSSTUBE (AS 350/355 HI AFT)	SCALE NTS
A	06.03.31	NEW ISSUE	
B	06.06.30	ADD D6018-125 & PRIME AND PAINT	
C	06.08.14	ADD CAD PLATING	

QTY	P/N	DESCRIPTION
X	D350-748-241	CROSSTUBE ASSEMBLY (AS 350/355 HI AFT)
1	D6018-125	CROSSTUBE (OR D6015-125)
2	D3502-1	SUPPORT
2	D2856-400-710	ABRASION STRIP
1	AELS-1032-225	INSERT
1	AN960JD10	WASHER
2	MS21920-20	CLAMP (PER DART SPEC. M-MS21920-20)
1	MS27039-1-10	SCREW

D350-748-141 CROSSTUBE:

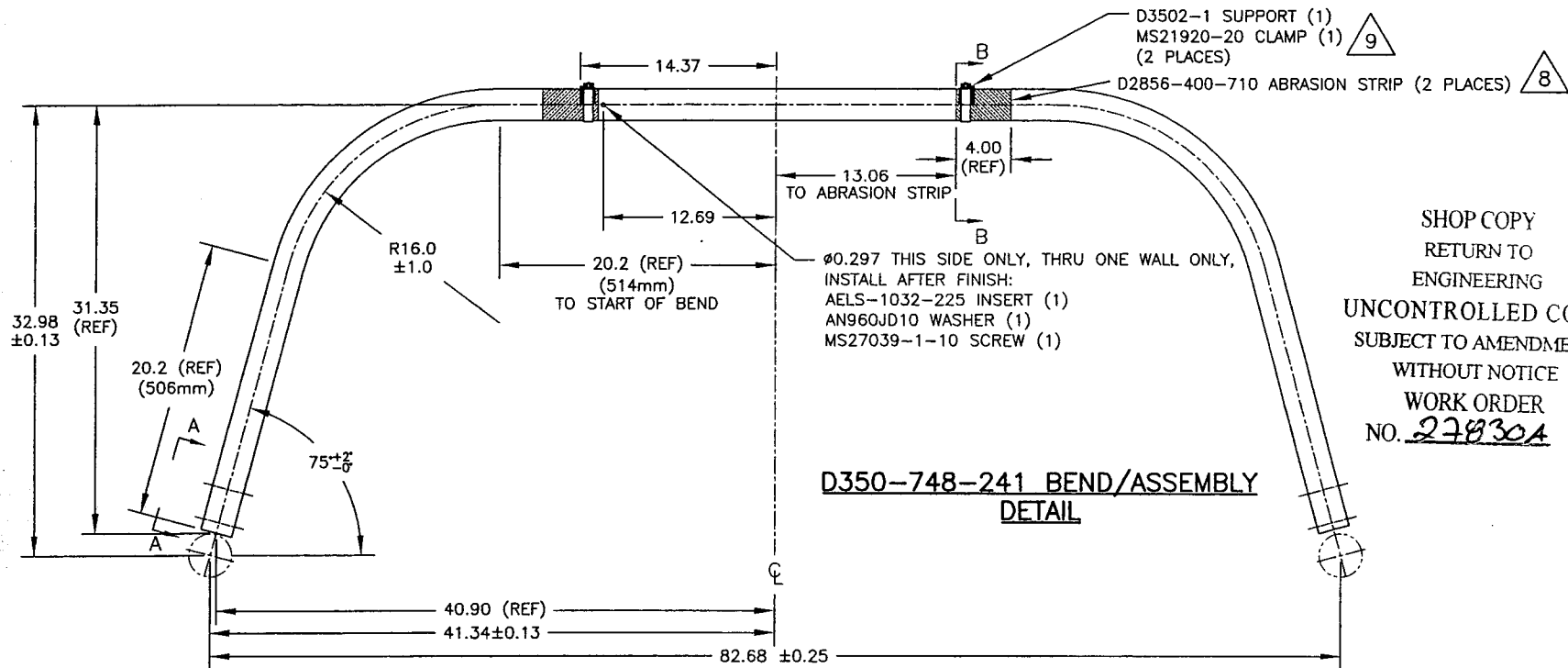
- 1) MATERIAL: MANUFACTURED FROM D6018-125 OR D6015-125
FINISHED LENGTH = 122.70±0.06
- 2) MACHINE PER MACHINING DETAIL ON PAGE 3. BLEND OUT ALL EDGES FROM MACHINING LONGITUDINALLY, TRANSITIONS SHOULD BE SMOOTH. NOTE: ALL HOLES ARE DRILLED AFTER BENDING.
- 3) SCRIBE DART PART NUMBER AND BATCH NUMBER IN THIS AREA WITH VIBRATING STYLUS
- 4) BEND PROGRESSIVELY WITH A MINIMUM OF 7 PASSES. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 6% BASED ON O.D.
- 5) HEAT TREAT TO MIN. 180 KSI PER MIL-T-6736 OR AMS 2759-1C AFTER TURNING
- 6) FINISH: CADMIUM PLATE PER QQ-P-416F, CLASS 1, TYPE II
MAGNETIC PARTICLE INSPECT PER ASTM E1444 AFTER CADMIUM PLATING
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2
PAINT OUTSIDE PER DART QSI 005 4.2
- 7) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE. WHEN DRILLING HOLES EXTREME CARE MUST BE TAKEN AND CAREFUL DEBURRING PERFORMED TO ENSURE A CLEAN HOLE WITH NO CRACKING/CHIPPING/GROOVES.
- 8) INSTALL D2856-400-710 ABRASION STRIP WITH A GAP ON BOTTOM SIDE OF CROSSTUBE, CENTERED OPPOSITE D3502-1 SUPPORT, PER QSI 035.
- 9) TORQUE MS21920-20 CLAMPS 60 TO 80 IN-LB
- 10) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
- 11) ALL DIMENSIONS ARE IN INCHES
- 12) PART IS SYMMETRIC ABOUT CENTERLINE EXCEPT FOR Ø0.297 HOLE.

RELEASED

06.08.15 #

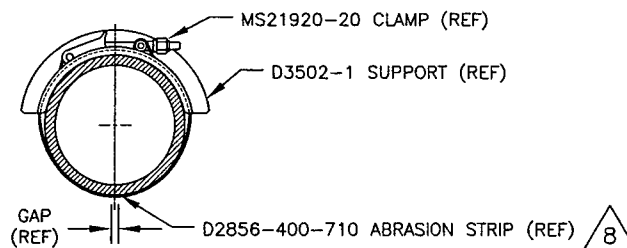
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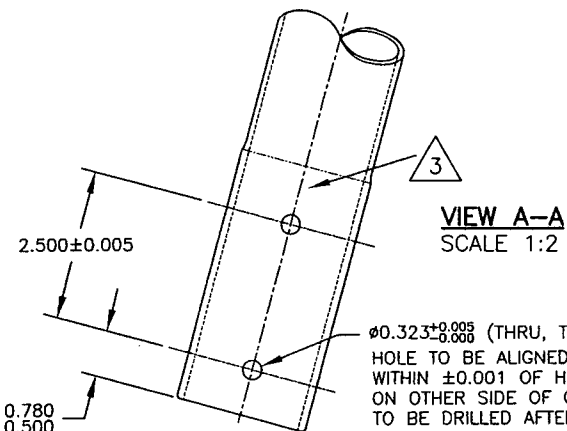
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**SECTION B-B
SCALE 1:2**



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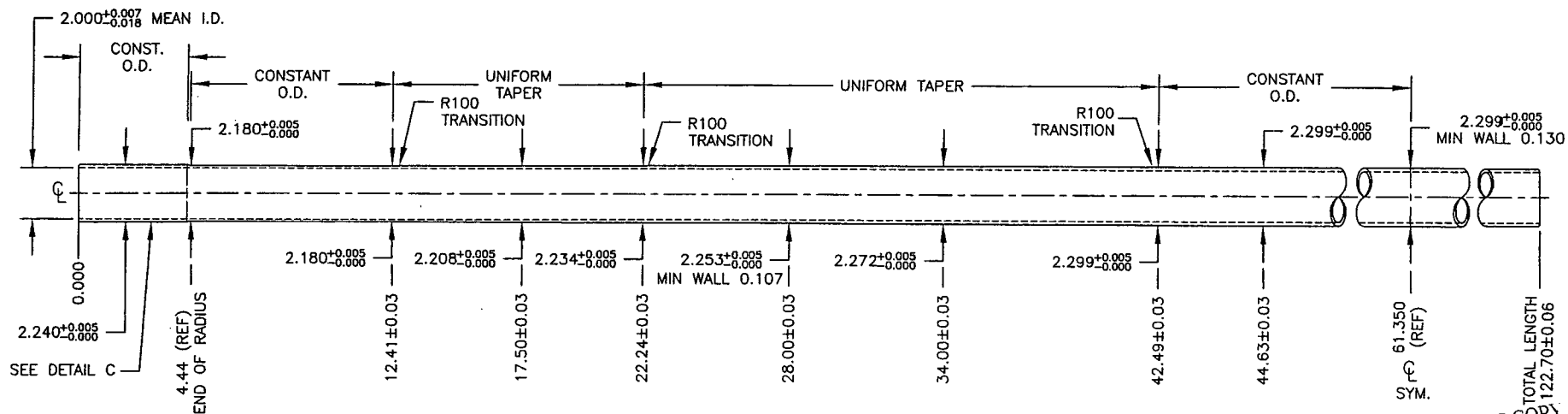
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DESIGN	90	DRAWN BY	90	DART	DART AEROSPACE LTD. HAWKESBURY, ONTARIO, CANADA
CHECKED	#	APPROVED	#	DRAWING NO.	D350-748-241
DATE	06.08.14	TITLE	CROSSTUBE (AS 350/355 HI AFT)	REV. C	SHEET 2 OF 3
		SCALE	1:8		

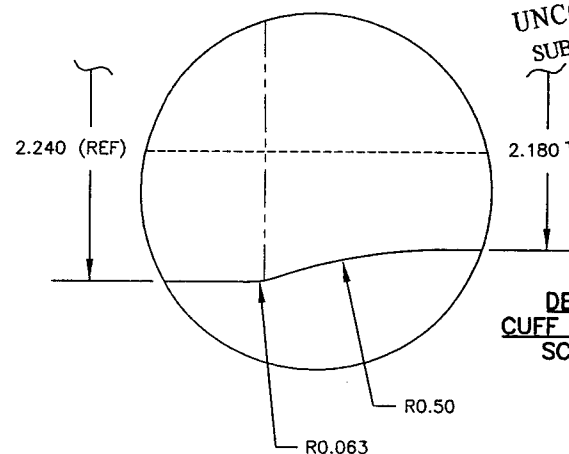
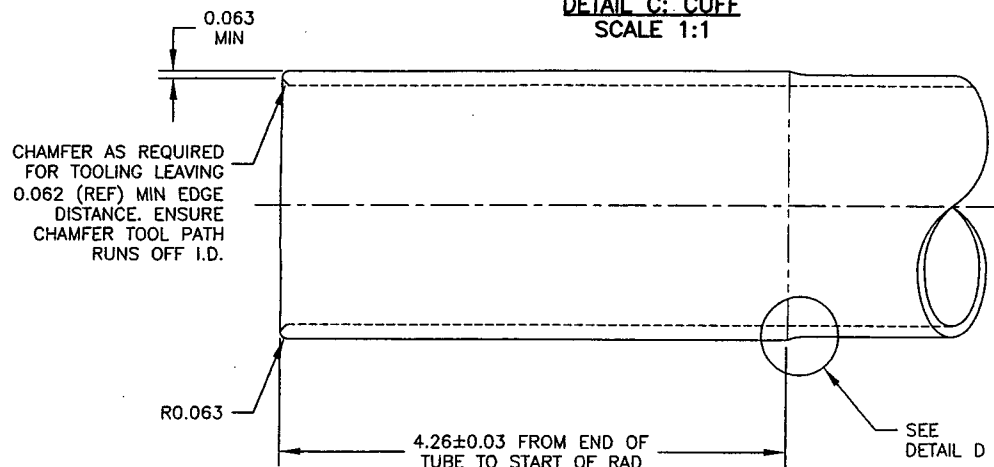


RELEASED

06.08.15

D350-748-241 MACHINING DETAIL

DETAIL C: CUFF
SCALE 1:1



DETAIL D:
CUFF TRANSITION
SCALE 9:1

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DESIGN	DRAWN BY	DART	DART AEROSPACE LTD. HAWKESBURY, ONTARIO, CANADA
CHECKED	APPROVED	DRAWING NO.	REV. C
DATE		D350-748-241	SHEET 3 OF 3
06.08.14		TITLE	SCALE
		CROSSTUBE (AS 350/355 HI AFT)	1:4

PACKING LIST

PACKING LIST NO: 310991

DATE: 09/22/06

DART AEROSPACE
1270 ABERDEEN STREET
HAWKESBURG ON K6A 1-K7

P.O. NUMBER: 274711

TERMS: C.O.D.

QUANTITY BALANCE PART NUMBER/DESCRIPTION
SHIPPED QTY

1	0	D350-748-141	S/N: B27825A JOB: 542793
1	0	D350-748-141	S/N: B27823A JOB: 542813
1	0	D350-748-141	S/N: B27826A JOB: 542814
1	0	D350-748-241	S/N: B27830A JOB: 542815
1	0	D350-748-241	S/N: B72827A JOB: 542816
1	0	D350-748-241	S/N: B27828A JOB: 542817

1. Stress relieve at 350-400°F for 4 hours minimum
2. Cadmium plate per AMS-QQ-P-416B, Type II, Class 1 (QQ-P-416, Type II, Class 1)
3. Embrittlement relieve within 4 hours of plating at 350-400°F for 8 hours minimum
4. Magnetic particle inspect per ASTM E 1444-05. No linear indications/cracks allowed.

Qty Ins: 6 Qty Rej: 0 Qty Acc: 6

PACKING LIST

PACKING LIST NO: 310991

DATE: 09/22/06

DART AEROSPACE
1270 ABERDEEN STREET
HAWKESBURG ON K6A 1-K7

P.O. NUMBER: 274711

TERMS: C.O.D.

QUANTITY	BALANCE	PART	NUMBER/DESCRIPTION
SHIPPED	QTY		

5. Inspect

Docn No.:
Ship Via: OTHERS

K



SOUTHWEST

United Industries, Inc.

422 S. ST. LOUIS / TULSA, OK 74120
PHONE 918-587-4161 / FAX 918-582-6158
ACCOUNTING FAX 918-585-2952

CERTIFICATION

CERT NO: 310991
DATE: 09/22/06

DART AEROSPACE
1270 ABERDEEN STREET
HAWKESBURG ON K6A 1-K7

P.O. NUMBER: 274711

P/S 71

QUANTITY PART NUMBER/DESCRIPTION

1	D350-748-141	S/N: B27825A JOB: 542793
1	D350-748-141	S/N: B27823A JOB: 542813
1	D350-748-141	S/N: B27826A JOB: 542814
1	D350-748-241	S/N: B27830A JOB: 542815
1	D350-748-241	S/N: B27827A JOB: 542816
1	D350-748-241	S/N: B27828A JOB: 542817

1. Stress relieve at 350-400°F for 4 hours minimum
2. Cadmium plate per AMS-QQ-P-416B, Type II, Class 1 (QQ-P-416, Type II, Class 1)
3. Embrittlement relieve within 4 hours of plating at 350-400°F for 8 hours minimum
4. Magnetic particle inspect per ASTM E 1444-05. No linear indications/cracks allowed.

Qty Ins: 6 Qty Rej: 0 Qty Acc: 6

5. Inspect

WE CERTIFY THAT THE PARTS LISTED ABOVE HAVE BEEN PROCESSED IN ACCORDANCE WITH THE REQUIREMENTS AND SPECIFICATIONS OF THE ABOVE REFERENCED PURCHASE ORDER. DOCUMENTATION IS ON FILE AND AVAILABLE FOR REVIEW

Certification

FAA Repair Station CN2R748K

Randy Bruner
Inspector

NOTE: SUBJECT TO SOUTHWEST COMPANIES, INC. STANDARD TERMS & CONDITIONS



INVOICE

DART AEROSPACE
1270 ABERDEEN STREET
HAWKESBURG ON K6A 1-K7

INVOICE NO: 310991
DATE: 09/22/06
SHIP DATE: 09/22/06
P.O. NUMBER: 274711
TERMS: C.O.D.

QUANTITY	PART NUMBER/DESCRIPTION		UNIT PRICE	AMOUNT
1	D350-748-141	S/N: B27825A JOB: 542793	1980.00	1980.00
1	D350-748-141	S/N: B27823A JOB: 542813		
1	D350-748-141	S/N: B27826A JOB: 542814		
1	D350-748-241	S/N: B27830A JOB: 542815		
1	D350-748-241	S/N: B72827A JOB: 542816		
1	D350-748-241	S/N: B27828A JOB: 542817		

1. Stress relieve at 350-400°F for 4 hours minimum
2. Cadmium plate per AMS-QQ-P-416B, Type II, Class 1 (QQ-P-416, Type II, Class 1)
3. Embrittlement relieve within 4 hours of plating at 350-400°F for 8 hours minimum
4. Magnetic particle inspect per ASTM E 1444-05. No linear indications/cracks allowed.

Qty Ins: 6 Qty Rej: 0 Qty Acc: 6

INVOICE

DART AEROSPACE
1270 ABERDEEN STREET
HAWKESBURG ON K6A 1-K7

INVOICE NO: 310991
DATE: 09/22/06
SHIP DATE: 09/22/06
P.O. NUMBER: 274711
TERMS: C.O.D.

QUANTITY PART NUMBER/DESCRIPTION

UNIT PRICE AMOUNT

5. Inspect

Docn No.:
Ship Via: OTHERS

K

Total Amount 1980.00

Chris Provencal

From: David Shepherd [dshepherd@dartaero.com]
Sent: October 3, 2006 10:03 AM
To: 'Chris Provencal'
Cc: 'S Shahbazian'; 'Beckett, Bill'
Subject: RE: 350 xtube cad plating

Chris,

I think the modified CAD plating procedure is acceptable.

As we discussed, I had some concern about the stress relieving comment on the packing slip because I didn't realize that by heating up the tubes, we would be stress relieving them. We didn't test our crosstubes in a stress relieved condition. The crosstubes we tested had compressive stresses in the tensile stress areas of the crosstube. However, because the highest stress areas are in the unbent portion of the crosstube and because I think we had so much margin in our drop test (no shock absorbers, damaged parts, overloaded, etc ...), my gut tells me that we are OK and I don't think we need to re-test.

I'm glad to hear that we are dimensionally checking the crosstubes after all the heating. I think this step should be added to the work order on receiving inspection for every crosstube.

As we discussed, I think a drawing revision is in order. I think reference to a QSI for the procedure outlined on the packing slip would be best.

David

From: Chris Provencal [mailto:cprovencal@dartaero.com]
Sent: Monday, October 02, 2006 2:17 PM
To: David Shepherd (David Shepherd)
Cc: 'S Shahbazian'; 'Bill Beckett (Bill Beckett)'
Subject: 350 xtube cad plating

David,

There is another set of 350 xtubes they want to send out tomorrow. I don't know if you've had a chance to review the cad plating issue. They're eager to get a response.

To recap:

-I originally told you that the magnetic particle was done first. That was the plan, but they ended up following the drawing (cad->magnetic). The invoice I sent you gives the correct order the work was done.

-The cad plating was done to AMS-QQ-P-416B (issued 2004 by SAE) instead of the drawing's' QQ-P-416F (issued 1991 by military). I don't see a problem with this since it's a more current issue, and the only reason we specified QQ-P-416F is because that's what the "old" never-used supplier suggested.

-The dims were re-checked after cad plating and the dimensions did not change.

-An NCR has been created to address the problem with the work orders. The bigger issue is that one was sent to a customer and we need to take action on that one asap.

If you need more info, let me know.

03/10/2006